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AUTHOR Ekwurzel, Drucilla; Saffran, Bernard
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ABSTRACT

The basics of online searching for bibliographic citations are presented through use of the "Economic Literature Index" (ELI), which is available as File 139 on Dialog Information Services. This article focuses on the choice of media for bibliographic searches, search strategies, and the selection of alternative databases, such as "Social Scisearch" and "Abstracts of Working Papers in Economics (AWPE)". Six major types of retrieval techniques are addressed: (1) author searches; (2) searches for words in titles or abstracts; (3) searches using keywords or subject descriptor codes; (4) searches that combine all three techniques; (5) searches for articles that cite a particular article; and (6) retrieval of citations and abstracts of working papers. Searching examples for specific topics such as efficiency wage theory, comparable worth, productivity studies, and auction theory are described, along with the relationship of ELI subject descriptor codes to the classification system used in the printed versions of the "Journal of Economic Literature" and "The Index of Economic Literature". Appendixes include an ELI file description, classification system descriptors and codes, and a sample search request form. (JHP)

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ONLINE INFORMATION RETRIEVAL FOR ECONOMISTS- THE ECONOMIC LITERATURE INDEX

by

Drucilla Ekwurzel

and

Bernard Saffran

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Online Information Retrieval for Economists— The Economic Literature Index

By Drucilla Ekwurzel
Journal of Economic Literature

and

Bernard Saffran
Swarthmore College

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HOW WOULD YOU go about finding articles on comparable worth or efficiency wage theory? To conduct a search on these topics, both discussed at the ASSA meetings in December 1984, you might consult the yearly volumes of the *Index of Economic Articles* or other hardbound indexes, where you would find references to begin a literature search. You also might ask a librarian to track down articles for you. This process could take hours, days, or weeks. If you or the librarian had searched an online bibliographic index with a computer, you could have found, as we did, 18 bibliographic citations to articles related to the topic of comparable worth in less than four minutes. We also were able to retrieve bibliographic citations for 46 articles in a search for articles on efficiency wage theory in about ten minutes. On our equipment the cost was about $5.00 to retrieve the 18 citations found in our search for articles on comparable worth. To find the 46 citations in our efficiency wage theory search, it cost us about $12.00.

What is an online bibliographic index and how does one make use of this medium? In the discussion below, we will explain the online retrieval of citations of

articles on the Economic Literature Index and two other bibliographic indexes containing citations to economics articles. We will describe the strategies we used to find articles on comparable worth, efficiency wage theory, and other topics, including three other December 1984 ASSA meeting topics—auction theory, recent productivity studies on OECD countries, and articles on Gossen. We will also have more to say below about search costs.

Online information retrieval, or the capability of using a computer in an interactive mode to search for information in large databases, has become an important resource for many types of research. Using a computer terminal and a telephone line, it is now possible to access the entire Library of Congress card catalog, to see up-to-the-minute stock quotations or airline schedules, or even to read the entire text of articles in the *Harvard Business Review*. In addition to bibliographic databases, economists may be especially interested in using business databases that contain time-series data or financial data on publicly owned corporations or demographic databases, such as the U.S. Census data. These are only a few of the approximately 2,400 databases publically available online at this time (Daniel Seligman 1985, p. 68).

A Brief History of Online Services

Research on the application of the computer's capability to bibliographic searching began in the 1950s. The first online bibliographic text search system was demonstrated in 1960 by System Development Corporation (SDC) (Charles P. Bourne 1980). The development of interactive systems that "interpret and execute search formulations and commands interactively with the user" (Bourne 1980, p. 157) proceeded rapidly in the next decade as the key technological components became available. Crucial to the conveyance of services to large audiences was the provision of a low-cost way to connect remote terminals to the online service's computer (Bourne 1980). As such data communications networks as TYMNET, TELENET, and UNINET became available, use of online services grew rapidly. These networks and others provide flat rate communication links from major cities to the remote computer system.

Until the advent of the personal computer, it was primarily institutions and businesses that benefited from the availability of online information sources, although many libraries have offered these services to their patrons. The personal computer and devices for linking home computers to telephones have further increased the number of users of information services. Individuals who acquire home or office desk-top computers may now conduct their own information searches. However, to search successfully and efficiently requires a certain amount of understanding of basic searching strategy and of the databases in which the information may be found.

Online Bibliographic Information Retrieval

This article will describe the basics of online searching for bibliographic citations using the Economic Literature Index (ELI). The ELI, published by the American Economic Association, is an outgrowth of the production of the *Journal of Economic Literature* and the annual volumes of the *Index of Economic Articles*. Online bibliographic citations are available to the journal articles indexed in JEL since 1969.[1] Entries are updated quarterly and are actually available online slightly ahead of the JEL quarterly issues. Article citations in the ELI contain the familiar bibliographic description (author, title, journal, and so on) as well as addi-

[1] SOCIAL SCISEARCH™, which we discuss later in this article, provides the capability of finding articles in earlier years if they have been cited as references in articles they index.

tional information provided by from one to seven subject descriptors, one to five geographic area descriptors, and in the history of economic thought category, descriptors indicating the "named people" discussed. All of these descriptors appear with the article citation on the ELI. Citations to articles added since early 1984 also include the abstracts that appear in the JEL quarterly issues (see the Selected Abstracts department of this issue). In 1985 citations to articles in collective volumes (included in the annual *Index* volumes) were added, beginning with articles published in 1979. In the discussion below we will describe ways to make use of these features for efficient online searching.

The ELI is accessible through DIALOG Information Services. DIALOG, one of a large number of "information retrieval" vendors, was active in the development of online information retrieval and first offered online services to the public in the early 1970s (Bourne 1980, p. 157). This company now provides access to over 150 databases, including both bibliographic and numeric indexes. DIALOG's coverage varies from the online versions of *Chemical Abstracts* and *Dissertation Abstracts* to a career placement registry, the U.S. Government Printing Office's monthly catalog, and many other databases. DIALOG publishes an instruction manual (1985) as well as individual documentation chapters for each of its databases. Charges for individuals are on a connect time basis, with no minimum usage requirement or subscription fee; a toll-free telephone call is enough to initiate a subscription to DIALOG's services (see Appendix 4).

This article focuses on online searches for bibliographic citations in the ELI; however, we will also attempt to provide guidance on a number of related issues, including the choice of media for bibliographic searches, such as hard copy versus online searches; different searching strategies; and some indications of the usefulness of alternative databases for different types of bibliographic questions. We will include some discussions of searches on the Institute for Scientific Information's® online version of the *Social Sciences Citation Index*® (SOCIAL SCISEARCH™), through which one may retrieve citations to articles in more than 1,400 social science journals published since 1972 and to the references listed in these articles. We will also refer to the newly available *Abstracts of Working Papers in Economics* (AWPE), produced by Cambridge University Press.

We include searches on other databases in order to indicate that it is necessary for the researcher to evaluate the suitability of a database for the retrieval of the desired information, but it should be understood that we are most familiar with the features of the ELI. For many of our illustrative searches, any of the three indexes would have provided suitable examples. When the same searching technique applies to all three indexes, we illustrate the use of the technique on the ELI.

We do not compare databases or make claims about their efficiency. Because of our greater knowledge of the ELI, our searches were more efficient on this index; also the searches were not independent, since we used information obtained from searches first executed on the ELI in later searches on SOCIAL SCISEARCH and AWPE. In addition, there are other online databases that include economics journals. We have not attempted to identify or search on any databases beyond the three mentioned above.[2]

The discussion of retrieval techniques will be limited to descriptions of six major

[2] For a survey of online databases useful for economic research, see Allan Foster (1984). Foster's article describes the contents of twenty-one bibliographic and twenty numeric databases.

types: (1) author searches, (2) searches for words in titles or abstracts (free-text), (3) searches using keywords or subject descriptor codes, (4) searches that combine all three techniques, (5) searches for articles that cite a particular article, and (6) retrieval of citations and abstracts of working papers. We will illustrate techniques 1–4 using examples from the ELI, technique 5 using the SOCIAL SCISEARCH index, and technique 6 using the AWPE index. We will indicate the scope of the three different databases and their coverage of sources in the discussion below and in the concluding summary.

To illustrate the searching methods, we will describe searches for specific topics of interest to economists; most of the topics were suggested by the sessions at the 1984 Dallas meeting of the Allied Social Science Association. Among the topics we chose for searching examples are efficiency wage theory, comparable worth, recent productivity studies on OECD countries, auction theory, and articles on Gossen. Along the way we will make several observations about the significance of online searching for economists. In the summary of the article, we will briefly discuss working with librarians as search intermediaries.

The ELI Database

The ELI consists of more than 100,000 bibliographic citations to articles with economic content appearing in more than 280 economics journals since 1969. About 20 percent of the English-language journals covered are published by universities or organizations outside the United States; another 15 percent of the journals indexed include articles in foreign languages with English summaries; and a small percentage are in foreign languages without English summaries. A complete online bibliographic record consists of the bibliographic citation and abstract (where available), as well as subject, geographic, and "named people" descriptors. Citations to articles appear online three to six months after the article is published because the ELI database is updated at quarterly intervals.

All citations in the ELI carry four-digit subject descriptor codes. It is important for the researcher to understand that the ELI descriptor codes are the subject classifications used in the annual *Index of Economic Articles* and not the three-digit subject headings used in the JEL Subject Index of Articles in Current Periodicals. The four-digit subject descriptor codes are actually breakdowns of the JEL three-digit classifications; for example, the JEL has one classification "022" for articles on microeconomic theory, while the ELI has at present eight subcategories, including "0222 Theory of the Household; Consumer Demand," "0223 Theory of Production," and so on. (A list of ELI subject descriptor codes appears in Appendix 2.) Each citation retrieved on the ELI displays all of the subject descriptor codes (up to seven) assigned by JEL staff members to the article. ELI citations may also include up to five indicators of geographic areas where applicable. These features provide additional information about the subject content.

The ELI subject descriptor codes provide a powerful tool for searching for specific topics because they can be combined to describe the subject more fully. For example, if we wished to obtain articles on multinational mining operations, we could combine the subject descriptor code for multinational corporations (4420) and the subject descriptor code for the mining industry (6322) to retrieve citations. We show this search in Example 1 in the section below on searches where we describe, step by step, the basic mechanics of online searching.

Searches

Preliminaries

Economists should have little difficulty using the DIALOG and other online information retrieval systems because of their familiarity with other interactive "canned" computer programs. Searches rely on combining instructions using the Boolean algebra operators "and," "or" (that is, the inclusive use of "or"), and "not." The command system provides additional ways to expand or limit search terms, some of which we will illustrate in the examples below.[3] DIALOG provides instructions for communications protocols, so that after entering one's password and selecting a database (file), one may immediately begin searching. Many may prefer to leave the computer contact to a librarian, but to obtain the most useful information, it is necessary for the searcher to interact with the system. Therefore it is helpful to understand basic searching strategies and the structure of the database.

Search Costs

While there are many different rates for databases, individual vendors, and user categories, probably the most influential factor in the cost of an online search is the speed of the retrieval equipment. The charge for the ELI, without discounts, is $75.00 per hour, calculated to the hundredths of a minute. Telecommunications charges vary, but are based on the cost of a local telephone call (in major cities) plus a flat rate hourly charge.

In order to illustrate the magnitudes involved, we used two different types of equipment to compare searches. With a slow retrieval system consisting of a 300 BAUD modem, which transmits at a 30 character per second rate, and a keyboard printer terminal, the cost of searching for and printing out the eleven citations found in Example 1 (explained below) was about $6.30. This charge includes an $8.00 per hour flat rate for the telecommunications network we used, but does not include any local telephone charges. Using a faster communication speed (1200 BAUD) and a computer system, the same search cost only $2.30. The major reason for this dramatic cost difference is that DIALOG's charges are based on the amount of time the searcher is connected to the system. (This means that searching skill is also an important cost factor.) Example 1 below, which was an uncomplicated search, took 4.5 minutes on the slow equipment and only 1.6 minutes on the faster system. The time and cost comparison for Example 3, a longer search where we printed 46 citations, was about 25 minutes on the slow equipment as opposed to 8.4 minutes on the faster equipment, and the costs were approximately $35.00 versus $12.00. These examples point out the substantial effect of equipment on online retrieval costs. There are faster printers and modems available than the equipment we had access to, and costs may be correspondingly lower.

Search Examples

As searching examples we will often use the same topics, illustrating first simple and then more complicated search techniques. We will explain variations of search and format commands as we come to them in the examples. In the searches below, we will describe how to choose or combine the options of searching for titles (/TI), authors (AU=), descriptors (DC=), and other features. We will not discuss all the searching techniques available on the ELI, but rather take the reader through the steps of the formulation of a search strategy. A basic list of ELI search options is included in Appendix 1.

[3] DIALOG sells a documentation "chapter" that provides specific instructions for searching the ELI and suggests several search strategies. This publication is available from DIALOG for $5.00.

EXAMPLE 1

MULTINATIONAL MINING CORPORATIONS

[The searcher would follow local access instructions to connect with DIALOG.]

Step	Search	
1	DIALOG INFORMATION SERVICES PLEASE LOGON: ?XXXXXXXX	[Enter DIALOG password]
2	?* **B 139**	[Begin File 139, the ELI]
	FILE 139:ECONOMIC LITERATURE INDEX – 1969–85/MAR** SET ITEMS DESCRIPTION	
	? **SS DC=4420 and DC=6322**	
	[set] S1 1469 DC=4420	[multinationals]
	S2 301 DC=6322	[extractive industries]
	S3 11 DC=4420 and DC=6322	
3	? **T 3/5/1–11*** **	

Note: Examples show actual search statements (boldface) and DIALOG system responses (capital letters); explanations appear in brackets. The information in Step 1 of this search is omitted in the following examples.

* DIALOG prompt, which tells the user to type in search statement.

** Month of latest update at time of search. The searches in this and the following examples were conducted between February and May 1985.

*** See Example 2 for explanation of Format statements.

We will build up the searches, first looking for authors, words in titles or abstracts, and subject descriptors, without linking any of these elements. In some of the illustrations the searches do not work well using only one technique; combining techniques will be shown to be the better strategy. However, to avoid confusion, we will defer the illustrations that combine techniques until after we explain each technique individually. The examples in the boxes show the full search strategy.

In Example 1, we show in step 1 how to address DIALOG Information Services using a modem to make the necessary telephone connection with a computer terminal. DIALOG provides a list of telephone numbers for the various communications networks, which have local telephone numbers in major cities in the United States as well as in a number of other countries. Communications protocols vary depending on the telecommunications network the searcher uses, so we start in step 1 with the login command after the researcher has been connected to the DIALOG system.

Step 2 shows the search questions that a researcher or librarian would type on the terminal (shown in Example 1 in boldface type). The responses by the DIALOG system are printed in capital letters. Explanations appear in brackets. As shown in Example 1, at the first prompt ("?") the searcher replies "B 139" in order to open file 139, the ELI. After the second prompt, the searcher types "SS DC=4420 and DC=6322." "SS" is short for "Select Steps"; "DC" means "Descriptor Code"; 4420 and 6322 are the ELI subject descriptor codes; the Boolean operator is "and" because the searcher wants only those articles that have been classified under both 6322 ("Industry Studies, Extractive Industries—Mining. . .") and 4420 ("International Business; Management and Policies; Economic Imperialism and Host Country Policies"). (See Appendix 2.)

Next the system creates sets for DC=4420, DC=6322, and the combina-

EXAMPLE 2

FORMAT STATEMENTS AND TYPE COMMANDS ILLUSTRATED FOR EXAMPLE 1

? **T 3/1/2** [type: set 3/Format 1/2nd article]

FORMAT 1: DIALOG accession number

138223 [article may be recalled using accession number]

? **T 3/2/2** [type: set 3/Format 2/2nd article]

FORMAT 2: Full record without abstract

138223
Managing Resource Dependency: The United States and Japan in the Markets for Copper, Iron Ore, and Bauxite
Rodrik, Dani
World Development, July 1982, 7, 541–60
Geographic Location: U.S.; Japan
Descriptors: Trade Relations (4210); International Business, Management and Policies, Economic Imperialism and Host Country Policies (4420); industry studies, extractive industries—mining metal, coal, and other nonmetallic minerals (6322)

? **T 3/3/2** [type: set 3/Format 3/2nd article]

FORMAT 3: Bibliographic citation (Note: this format does not include descriptors)

138223
Managing Resource Dependency: The United States and Japan in the Markets for Copper, Iron Ore, and Bauxite
Rodrik, Dani
World Development, July 1982, 7, 541–60

? **T 3/4/2** [type: set 3/Format 4/2nd article]

FORMAT 4: Full bibliographic record with field tags

138223
FN— DIALOG ECONOMIC LITERATURE INDEX File 139|
AN— 0138223|
TI— Managing Resource Dependency: The United States and Japan in the Markets for Copper, Iron Ore, and Bauxite|
AU— Rodrik, Dani|
JN— World Development|
CI— 7|
PG— 541–60|
PY— July 1982|
DE— Trade Relations (4210)'International Business, Management and Policies, Economic Imperialism and Host Country Policies (4420)'industry studies, extractive industries—mining metal, coal, and other nonmetallic minerals (6322)|
GE— U.S.'Japan|

EXAMPLE 2 (continued)

? **T 3/5/2** [type: set 3/Format 5/2nd article]

FORMAT 5: Full bibliographic record

This record is the same as Format 2 above except that it includes the JEL abstract (see the Selected Abstracts department in this issue). (Note: abstracts are only online for journals indexed in 1984 and later years.)

? **T 3/6/2** [type: set 3/Format 6/2nd article]

FORMAT 6: Title and DIALOG accession number

138223
Managing Resource Dependency: The United States and Japan in the Markets for Copper, Iron Ore, and Bauxite

? **T 3/7/2** [type: set 3/Format 7/2nd article]

FORMAT 7: Bibliographic citation and geographic descriptors

138223
Managing Resource Dependency: The United States and Japan in the Markets for Copper, Iron Ore, and Bauxite
Rodrik, Dani
World Development, July 1982, 7, 541–60
Geographic Location: U.S.; Japan

? **T 3/8/2** [type: set 3/Format 8/2nd article]

FORMAT 8: Title, descriptors, and named people

138223
Managing Resource Dependency: The United States and Japan in the Markets for Copper, Iron Ore, and Bauxite
Descriptors: Trade Relations (4210); International Business, Management and Policies, Economic Imperialism and Host Country Policies (4420); industry studies, extractive industries—mining metal, coal, and other nonmetallic minerals (6322)

tion of sets 1 and 2. As shown, the DIALOG response gives the number of records in each set.[4] The response the searcher is interested in is that there are 11 citations to articles on multinational corporations in extractive industries (set 3).

Step 3 shows the request to the system to type out the 11 citations found in set 3. A number of formats are available for typing or printing (offline) bibliographic citations with or without abstracts. These formats are illustrated in Example 2 below and further explained in Appendix 1.

Example 2 shows different format choices for typing out one of the citations found in Example 1. Please note that all the subject descriptors are only printed out in Formats 2, 4, 5, and 8. In the discussion below we will describe how to use subject descriptors found in an initial search as clues to alternative searching strategies. We will also discuss how to use abstracts (Format 5) to obtain clues for pursuing a search. Example 1 is a simple, straightforward illustration of a search for information on multinational mining industries; yet even in this short example the interactive nature of the search is clear. In the discussion below we will use several more complicated topics, including several topics from the December 1984 ASSA meeting sessions, in order to illustrate the potential of online searching for bibliographic references in economics.

Searching Techniques

Author Searches

Author searches are used to find citations to articles when the researcher knows which author he or she is interested in. By itself, this search technique is not always useful for exploring a research area as our first illustration will show. We use as an example a search for articles on efficiency wage theory, which was suggested by the topic of the American Economic Association Presidential Address by Charles L. Schultze at the 1984 ASSA Dallas meetings: "Microeconomic Efficiency and Nominal Wage Stickiness" (1985). Using this example, we will explain the steps involved in creating a search strategy.

In his article Schultze includes a summary of the literature on implicit contracts, in which he discusses efficiency wage theory. In his footnotes 4 and 5 Schultze cites several references to articles on efficiency wage theory, according to which the productivity of labor depends upon the wage rate. We used this information to begin our search by looking for articles by the authors referenced in Schultze's footnotes 4 and 5: Carl Shapiro and Joseph E. Stiglitz (1984), Edward Lazear (1984), Janet Yellen (1984), and Victor Goldberg (1982).[5]

Before continuing, we will explain the author search shown in Example 3 in detail. In step 1, after entering the ELI file number (B 139), we entered as "select steps" (SS) each author cited by Schultze in footnotes 4 and 5 (1985). Because we wanted to search author fields, we used the descriptor "AU=" (see Appendix 1 for the ELI file description, which includes a list of prefix and suffix codes). Because an author's name is generally listed as it appears on an article (last name first) Victor P. Goldberg may appear as "Goldberg, V. P., Goldberg, Victor," etc. A way around this problem is to use a truncation feature, cutting the first name to the first initial with the question mark, and entering: AU=Goldberg, V?, and so on for the other authors.

The system responded by creating sets for each author, shown in Example 3 as "S1, 19 [citations found for] AU=

[4] Searches shown in this article were conducted between March and May of 1985.

[5] Articles cited in the text and in the examples were chosen because they illustrate points about searching techniques.

Goldberg, V?," etc. Set 6 shows that the combined total was 145 articles by the five authors. The ELI includes three author fields, so this set will include articles on which these authors are not necessarily the first listed author. (Articles with four or more authors are listed by the first author with "et al.") Clearly this list was too large and would have included citations to many articles not related to the subject, so we needed to limit this search by using other techniques. We continued the search using a technique called *free-text searching*.

Free-text Searching: Words in Titles and Abstracts

Descriptive words that might appear in the title or abstract of an article may be used as search terms to retrieve citations. In order to keep the illustration simple, we will continue our search for articles on efficiency wage theory by restricting the search to words in the title. In step 2, our second search statement (SS) shows how we looked for citations with the words *efficiency* and *wage* in the title field by using the suffix "/TI." Had we not restricted this search to the title field, we would have found citations with the words *efficiency* and *wage* appearing anywhere in the titles, abstracts, or subject descriptors, which would have meant we would have retrieved citations to articles on many other topics.

We found that we might retrieve twelve such citations. Here we did have the references typed out, but we found that only six of the twelve citations contained the term *efficiency wage* in the title. The rest of the citations used the two words in other contexts, such as "Union Wage Distortions and the Size and Efficiency of the Optimal Tariff" (John K. Hill 1984).

Two of the citations we found in step 2 were in the May 1984 *American Economic Review*, the Yellen article cited by Schultze and one by George A. Akerlof entitled "Gift Exchange and Efficiency-Wage Theory." The other four citations were: a two-part article, by Maarten Immink and Fernando Viteri (1981), on testing the efficiency wage hypothesis using Guatemalan data; an article entitled "Unemployment and the Efficiency Wage Hypothesis" by James M. Malcomson (1981), and finally an article entitled "The Efficiency Wage Hypothesis, Surplus Labour, and the Distribution of Income in LDCs" by Joseph E. Stiglitz (1976).

The Yellen article is a discussion of efficiency wage theory and unemployment, as is the Malcomson article. The Akerlof article defends efficiency wage theory with evidence from sociology and social psychology. Any of these articles might represent directions we might wish to pursue. The Stiglitz and Immink and Viteri articles reveal the theory's antecedents in the theory of economic development, which we might wish to read as background. In this search, however, we were interested in pursuing Schultze's suggestion that efficiency wage theory is now important in the macroeconomic discussion of labor markets, so we wished to find more citations to articles on this macroeconomic aspect. We therefore continued our search by combining search techniques, which we explain below.

In our next example of free-text searching, we looked for articles on comparable worth, using a proximity operator ("w" for "with") to avoid the problem of separated words such as efficiency and wage in Example 3. By linking *comparable* and *worth* by a "w" in parentheses (see Example 4, step 1), we will not find citations on other topics, such as "Are Fort Worth and Pittsburgh Comparable?" Here in the search statement we will not restrict the term to the title field by using the suffix "/TI" as we did in Example 3, step 2, so that the DIALOG computer will also search through abstracts for the term *comparable worth*.

EXAMPLE 3

EFFICIENCY WAGE THEORY

Step		Search		
1	?	**B 139**		[ELI, File 139, as of Mar. 1985]
	?	**SS AU=Goldberg, V? or AU=Lazear, E? or AU=Shapiro, C? or AU=Stiglitz, J? or AU=Yellen, J?**		
		[set] S1	19	AU=GOLDBERG, V?
		S2	17	AU=LAZEAR, E?
		S3	8	AU=SHAPIRO, C?
		S4	93	AU=STIGLITZ, J?
		S5	9	AU=YELLEN, J?
		S6	145*	AU=GOLDBERG, V? OR AU=LAZEAR, E? OR AU=SHAPIRO, C? OR AU=STIGLITZ, J? OR AU=YELLEN, J?
2	?	**SS efficiency/TI and wage/TI**		
		S7	1158	EFFICIENCY/TI
		S8	1221	WAGE/TI
		S9	12	EFFICIENCY/TI AND WAGE/TI
	?	**T 9/5/1****		
		150924		
		GIFT EXCHANGE AND EFFICIENCY-WAGE THEORY: FOUR VIEWS		
		AKERLOF, GEORGE A.		
		AMERICAN ECONOMIC REVIEW, MAY 1984, 74 2, 79–83		
		DESCRIPTORS: MICROECONOMIC THEORY—THEORY OF PRODUCTION (0233); THEORY OF LABOR MARKETS AND LEISURE, EMPIRICAL STUDIES ILLUSTRATING THEORIES (8210)		
3	?	**SS (S6 and DC=8210) not S9**		
			145	S6
		S10	2686	DC=8210 [labor market theory]
			12	S9
		S11	20	(S6 AND DC=8210) NOT S9

* Joint authorship reduces total articles from 146 to 145.

** We show only one example of a citation for each search, which is not necessarily the first citation retrieved if a later citation illustrates a point made in the text. The command to type all 12 citations in step 2 with abstracts is **T 9/5/1-12** (see Example 2).

The result of this search using "SS comparable(w)worth" (Example 4) was one article on state labor legislation in 1983 by Richard R. Nelson in the January 1984 *Monthly Labor Review*. According to the abstract, this article provides detailed summaries of state labor legislation. In the abstract we noted the term *equal pay* as a close synonym for *comparable worth*. Our next step was to search for the term *equal pay* in either titles or abstracts. This strategy yielded 17 additional citations, including one article by R. G. Gregory and R. C. Duncan entitled "Segmented Labor Market Theories and the Australian Experience of Equal Pay for Women" (1981); five comments or replies on this article; three articles on equal pay for women in the U.K.; one article each on equal pay in Norway, Switzerland, Canada, and Japan; three more articles on equal pay in the U.S.; and one general article on equal pay published in 1975.

The free-text search in Example 4 appeared to have produced a number of interesting references. To evaluate their usefulness, we decided to compare the citations we found with the references used by Mark R. Killingsworth and Heidi I. Hartmann in their papers presented at the

EXAMPLE 3 (continued)

```
      ?  T 11/2/1

         154495
            THE EXCESS SENSITIVITY OF LAYOFFS AND QUITS TO DEMAND
            HALL, ROBERT E.; LAZEAR, EDWARD P.
            JOURNAL OF LABOR ECONOMICS, APRIL 1984, 2 2, 233-57
            DESCRIPTORS: MICROECONOMIC THEORY—THEORY OF PRODUCTION (0223); THEORY OF LA-
            BOR MARKETS AND LEISURE, EMPIRICAL STUDIES ILLUSTRATING THEORIES (8210)
            ABSTRACT IN JEL
         [This citation also had an abstract not shown in this example.]

4     ?  SS (AU=Akerlof, G? or AU=Immink, M? or AU=Viteri, F? or
           AU=Malcomson, J?) and S10 not S9

            S12      29   AU=AKERLOF, G?
            S13       3   AU=IMMINK, M?
            S14       3   AU=VITERI, F?
            S15      12   AU=MALCOMSON, J?
                   2686   S10
            S16      14   (AU=AKERLOF, G? OR AU=IMMINK, M? OR AU=VITERI, F? OR
                          AU=MALCOMSON, J?) AND S10 NOT S9

      ?  T 16/2/1
         152291
            WORK INCENTIVES, HIERARCHY, AND INTERNAL LABOR MARKETS
            MALCOMSON, JAMES M.
            JOURNAL OF POLITICAL ECONOMY, JUNE 1984, 92 3, 486-507
            DESCRIPTORS: THEORY OF LABOR MARKETS AND LEISURE, EMPIRICAL STUDIES ILLUSTRATING
            THEORIES (8210)
            ABSTRACT IN JEL
         [This citation also had an abstract not shown in this citation.]
```

1984 ASSA session, "Comparable Worth—Where Do We Go from Here?"[6]

Killingsworth cites 16 references, among them are books and government reports, articles in collected papers volumes, a Wall Street Journal article, and one journal article—the Gregory and Duncan article (1981) we had found online using the term *equal pay* (see above), which analyzes the impact of Australia's equal pay policy on female joblessness. Hartmann provided us with a longer version of her Dallas meeting paper (Hartmann, Patricia A. Roos, and Donald J. Treiman 1985),[7] which also included a reference to the Gregory and Duncan article (the four other journal articles cited were not in economics journals, a consideration we will discuss below in the section on the SOCIAL SCISEARCH). It appears that by finding the citation to the Gregory and Duncan article, we have succeeded in discovering an article we ought to read on this topic. We will have more to say about how to use search results below.

We also ran a search for articles on

[6] We were able to compare searches on the ASSA December meeting topics with some of the articles from the sessions, which will be listed in the references at the end of the articles. We wish to thank those authors who were able to send copies of session papers we requested. In addition, we would like to thank Harold G. Vatter and John F. Walker for their paper "Real Public Sector Employment Growth, Wagner's Law and Economic Growth in the United States" from the session on Wagner's Law. We did not use this topic as an example in the final version of this article.

[7] The December 1984 ASSA meeting paper, Hartmann, "Research Needs in Comparable Worth," did not include any citations to economics journal articles.

EXAMPLE 4

COMPARABLE WORTH

Step		Search
1	?	**B 139** [ELI, File 139, as of Dec. 1984]
	?	**SS comparable(w)worth**
		[set] S1 1 COMPARABLE(W)WORTH
	?	**T 1/2/1**
		150255 STATE LABOR LEGISLATION ENACTED IN 1983 NELSON, RICHARD R. MONTHLY LABOR REVIEW, JANUARY 1984, 7 1, 59–75 GEOGRAPHIC LOCATION: U.S. DESCRIPTORS: PUBLIC POLICY; ROLE OF GOVERNMENT (8220) ABSTRACT IN JEL [This citation had an abstract not shown in this example.]
2	?	**SS equal(w)pay**
		S2 18 EQUAL(W)PAY
	?	**SS S2 not S1**
		S3 17 S2 NOT S1
	?	**T 3/2/8**
		123569 SEGMENTED LABOR MARKET THEORIES AND THE AUSTRALIAN EXPERIENCE OF EQUAL PAY FOR WOMEN GREGORY, R. G.; DUNCAN, R. C. JOURNAL OF POST KEYNESIAN ECONOMICS, SPRING 1981, 3 3, 403–28 GEOGRAPHIC LOCATION: AUSTRALIA DESCRIPTORS: THEORY OF LABOR MARKETS AND LEISURE; EMPIRICAL STUDIES ILLUSTRATING THEORIES (8210); LABOR MARKET STUDIES, WAGES, EMPLOYMENT—WAGE, HOURS, AND FRINGE BENEFIT STUDIES (8242); ECONOMICS OF MINORITIES, ECONOMICS OF DISCRIMINATION (9170) ABSTRACT IN JEL [Abstract does not appear online.]

Stackelberg equilibria, another session topic at the ASSA December meeting. The search (not shown) produced twelve citations with Stackelberg in the title, but when we compared the titles to the references in the two papers on Stackelberg equilibria from the session, "Cournot and Stackelberg Equilibria,"[8] we found no matching references. The reason was that none of the references in the two papers given at the meetings contained the name "Stackelberg" in their titles. By combining search techniques, we were able to find the journal articles cited in the Stackelberg session paper bibliographies, but it took printing 71 citations and a more complicated search strategy than we wish to discuss for illustrative purposes.

Generally, free-text searches work best when the words appear in abstracts as well as in titles. However, many citations do not use exactly the same words the researcher or librarian might use; this is the reason subject descriptor codes or keywords are helpful in online retrieval. The next section discusses making use of subject descriptor codes.

[8] The two papers are: "The Decision to Play a Cournot or a Stackelberg Game When Market Demand Is Imperfectly Known" (Edward L. Golding 1984) and "Uncertainty and Endogenous Stackelberg Equilibrium" (John Kambhu 1984).

EXAMPLE 5
AUCTION THEORY

Step		Search
1	?	**B 139** [ELI, File 139, as of Dec. 1984]
	?	**SS DC=0227** [Auction Theory]
		[set] S1 16 DC=0227
	?	**T 1/2/9**
		140503 BUNDLING DECISIONS BY A MULTIPRODUCT MONOPOLIST WITH INCOMPLETE INFORMATION PALFREY, THOMAS R. ECONOMETRICA, MARCH 1983, 51 2, 463–83 DESCRIPTORS: MICROECONOMIC THEORY—THEORY OF FIRM AND INDUSTRY UNDER IMPERFECTLY COMPETITIVE MARKET STRUCTURE (0226); MICROECONOMIC THEORY—THEORY OF AUCTION MARKETS (0227) ABSTRACT IN JEL [Abstract does not appear online.]
2	?	**SS (DC=0226 and auction?) not S1**
		S2 1371 DC=0226 [imperfect competition] S3 73 AUCTION? S4 7 (DC=0226 AND AUCTION?) NOT S1
	?	**T 4/5/1**
		119864 OPTIMAL AUCTIONS RILEY, JOHN G.; SAMUELSON, WILLIAM F. AMERICAN ECONOMIC REVIEW, JUNE 1981, 71 3, 381–92 DESCRIPTORS: MICROECONOMIC THEORY—THEORY OF FIRM AND INDUSTRY UNDER COMPETITIVE MARKET STRUCTURE (0225); MICROECONOMIC THEORY—THEORY OF FIRM AND INDUSTRY UNDER IMPERFECTLY COMPETITIVE MARKET STRUCTURE (0226) ABSTRACT IN JEL [Abstract does not appear online.]

Keywords or Subject Descriptors

Many online databases add keywords or subject descriptors to the bibliographic citation to indicate the nature of the subject matter in the article. The ELI articles are classified by subject using more than 300 numerical subject classifications (see Appendix 2), which are the same as the subject classifications used in the annual volumes of the *Index of Economic Articles*. As we have mentioned above, the numerical descriptor codes used in ELI are four-digit subdivisions of the JEL three-digit classifications and are therefore more descriptive of the content of an article than the more general JEL classifications.

In our first illustration of a search using subject descriptor codes we will investigate the ASSA December meeting session topic "Open and Sealed-Bid Auctions." Had we searched for the term *auction* using a free-text search, we would have found 73 citations (as of the December 1984 update). Instead, we made use of the descriptor code, "0227 Theory of Auction Markets" (see Example 5). The result was 16 citations specifically on auction theory. However, because this category was only added during 1982 (see Appendix 2), the earliest article we retrieved is from March 1982. A check of the 16 citations we did find against the references in the three papers from the ASSA session on auction

theory[9] showed that only one of the citations we found was cited by the session authors. A closer look at the reference lists for the three session articles showed that seven articles (several cited by more than one of the authors) are specifically on auction theory, but that four are prior to 1982 (when the auction theory subject descriptor was added) and two are in journal issues too recently published to be online at the time of our search. We will continue the auction theory search in the next section, where we discuss how to combine search techniques.

The ELI bibliographic record may carry up to seven subject descriptor codes, so a good way to search for articles is to find two or more subject descriptor codes that apply, as we showed in Example 1, a search for papers on multinational mining companies. However, another attempt at combining descriptor codes did not work so well, as shown in Example 6, where we looked for articles on the effects of regulation on automobile safety. This topic became a controversial subject in economics after Sam Peltzman's 1975 article, which argued that auto safety regulation may not have saved lives. Looking at the list of subject descriptor codes (Appendix 2) we spotted "6314—Industry Studies, Manufacturing—Transportation and Communication Equipment" and "9213—Consumer Protection," which we tried in step 1 of Example 6. The result was eight citations, including only three on automobile safety regulation; the remaining five were on auto recalls, auto emissions controls, and contradictions among regulations. The most disturbing result was that we did not find the Peltzman article. We will return to this problem below when we discuss combining searching techniques.

Two other features are available on the ELI: the "named people" and geographic descriptors. The "named people" descriptor is used to designate articles that discuss individual contributions to the history of economic thought. For technical reasons, an article can carry only two "named people" as descriptors (an article about several individual contributions would appear in another appropriate history of economic thought classification). Noting a session on Gossen at the December meetings,[10] we tried a search (not shown) on Herman Heinrich Gossen using the named people descriptor "/NA." The result was only one article: "The Normative Bias of the Walrasian Model: Walras versus Gossen," by William Jaffé (1977). We will use this lead below to search for articles citing the Jaffé article on the SOCIAL SCISEARCH index.

The other descriptor in the ELI index is the geographic descriptor. Geographic descriptors indicate studies or data for specific countries or larger geographic areas, such as Europe or Pacific or groups of countries, such as OECD, LDCs, or even "global" (indicating data for representative countries throughout the world). A citation may carry five geographic descriptors at most, so specific country data may be included in a larger grouping (such as LDCs, etc.). Geographic descriptors may be full country names (e.g., France), continents (e.g., Europe), geographic areas (e.g., Caribbean, Asian Pacific), or economic associations (e.g., OECD, OPEC). Where possible, abbreviations are used (e.g., N. America, LDCs, U.S., U.S.S.R.). Geographic descriptors are best used as a limiting device in conjunction with other searching techniques, unless one is looking for studies mentioning

[9] The three session papers on auction theory, by Eric S. Maskin and John G. Riley; Robert G. Hansen; and James C. Cox, Vernon L. Smith, and James M. Walker are published in the *American Economic Review*, Papers and Proceedings, May 1985.

[10] We received two papers from this session, both containing many references to works on Gossen outside the scope of the ELI: Nicholas Georgescu-Roegen, "Time and Value in Economics and in Gossen's System" (1985) and John K. Whitaker, "Gossen as a Pioneer of General Equilibrium Theory" (1984).

EXAMPLE 6

AUTOMOBILE SAFETY REGULATION

Step		Search			
1	?	**B 139**			[ELI, File 139, as of Mar. 1985]
	?	**SS DC=6314 and DC=9213**			
		[set] S1	285	DC=6314	[transportation and communication industry]
		S2	260	DC=9213	[consumer protection]
		S3	8	DC=6314 AND DC=9213	
	?	**T 3/5/8**			

055060
A BENEFIT-COST ANALYSIS OF AUTO SAFETY FEATURES
LAVE, LESTER B.; WEBER, WARREN E.
APPLIED ECONOMICS, 1970, 2 4, 265–75
DESCRIPTORS: CONSUMER ECONOMICS; LEVELS AND STANDARDS OF LIVING—CONSUMER PROTECTION (9213); INDUSTRY STUDIES; MANUFACTURING—TRANSPORTATION AND COMMUNICATION EQUIPMENT (6314); ECONOMICS OF TRANSPORTATION (6150)
ABSTRACT IN JEL
[Abstract does not appear online.]

2	?	**SS S2 and (DC=6150 or auto?) not S3**			
			263	S2	
		S4	1327	DC=6150	
		S5	664	AUTO?	
			8	S3	
		S6	11	S2 AND (DC=6150 OR AUTO?) NOT S3	
	?	**T 6/2/9**			

085787
THE EFFECTS OF AUTOMOBILE SAFETY REGULATION
PELTZMAN, SAM
JOURNAL OF POLITICAL ECONOMY, AUGUST 1975, 83 4, 677–725
DESCRIPTORS: CONSUMER ECONOMICS, LEVELS AND STANDARDS OF LIVING—CONSUMER PROTECTION (9213); ECONOMICS OF TRANSPORTATION (6150)
ABSTRACT IN JEL
[Abstract does not appear online.]

countries such as Iceland, which serves as a descriptor in only ten articles in the whole index.

Combining Searching Techniques

As we have emphasized, most of the searches above would have yielded better results if we had linked together several searching techniques. In this section we hope to show that our search examples have not begun as badly as one might think because they have provided important clues for more complex searches. We will use these clues to develop efficient and successful refinements of our searches. Specifically to illustrate the importance of the subject descriptor codes listed on the article citations we have already retrieved, we will use them to continue the searches for articles on efficiency wage theory (Example 3), auction theory (Example 5), and auto safety regulation (Example 6).

Our first search illustration, however, will again be a straightforward example of combining several search techniques. In Example 7 we searched for citations to articles on recent productivity studies, another ASSA December meeting topic. To illustrate the use of the geographic descriptor, we decided to limit our search to studies of OECD countries. Because we

EXAMPLE 7
RECENT PRODUCTIVITY COMPARISONS

```
? B 139                                                    [ELI, File 139, as of Mar. 1985]
? SS OECD/DE and DC=2260 and PY=1979:PY=1984
   [set]  S1      333   OECD
          S2      768   DC=2260          [growth and productivity
                                           theory and studies]
          S3    44887   PY=1979:PY=1984
          S4       12   OECD/DE AND DC=2260 AND PY=1979:PY=1984
? T 4/2/3
   147189
      THE DEVELOPMENT OF FACTOR PRODUCTIVITY IN AN INTERNATIONAL COMPARISON
      BOHM, BERNHARD; CLEMENZ, GERHARD
      EMPIRICA, 1983, 1, 41-66
      GEOGRAPHIC LOCATION: SELECTED OECD
      DESCRIPTORS: ECONOMIC STUDIES OF DEVELOPED COUNTRIES—COMPARATIVE COUNTRY
      STUDIES (1221); PRODUCTIVITY AND GROWTH, THEORY AND DATA (2260); LABOR PRODUCTIV-
      ITY (8250)
```

wished to retrieve citations of recent productivity studies (since 1979), we limited the publication years to 1979–84; therefore we used PY = 1979:PY = 1984 in our search statement ("PY" is the publication year prefix). Should we use the word *productivity*? We tried (not shown) and found that the ELI contained citations to 827 articles on productivity for those years. The solution was to use the subject descriptor code for "Productivity and Growth: Theory and Data" (2260), which limited the citations to the national income accounting types of studies we were interested in. Using OECD/DE ("/DE" is the suffix for geographic descriptors, see Appendix 1) and DC = 2260 and PY = 1979:PY = 1984, we obtained citations to 12 recent articles (see Example 7).

Among the results were five citations also carrying country study descriptors, an indication that they clearly included comparisons of productivity growth in OECD countries. The other seven articles, although containing discussions of productivity and/or growth in OECD countries, were primarily theoretical or on other topics, such as inflation or the impact of taxes on growth. The articles we found might give us the information we are looking for, or they might form the basis of a "hard-copy" search (i.e., consulting various hardbound indexes) where we would use the references found in the articles to find further source materials.

To underline these points with further illustrations, let us return to the efficiency wage theory search (Example 3). We will now show how both the author and free-text searches may be expanded. In step 2 we had found six relevant citations with the term *efficiency wage* in the titles. We could have stopped there, but to illustrate the development of a searching strategy, we will try to combine search techniques to find additional references.

We had typed out the 6 citations we had found earlier (in step 2) using Format 5, which includes all of the appropriate subject descriptor codes. In our original search, we had used the authors cited by Schultze (in footnotes 4 and 5 of his March 1985 article) to see whether these authors had written other articles, and 145 had turned up. To find the relevant ones, we decided to limit our search this time to those that carried the labor market de-

scriptor code. Therefore, our next search statement combined set 6 (all of the authors cited by Schultze) with the subject descriptor code 8210: "(S6 and DC = 8210)" (see step 3). Because we had already seen the citations to the 12 articles we had found before in set 9, where we used the words *efficiency* and *wage*, we added the statement "not S9" (see step 3). The result was an additional 20 articles on labor market theory by the five authors cited in the Schultze article as economists who had written on efficiency wage theory.

As a final step (step 4) we looked back at the results of step 2 where we had found 12 titles with the words *efficiency* and *wage*, but only 6 with the term *efficiency wage*. Two of the authors of these 6 articles, Yellen and Stiglitz, were among the 5 cited in the Schultze article, and we had retrieved their articles on labor market theory in our last search (step 3). Therefore, we next searched for other articles by the other four authors, also combining their names with the subject descriptor code 8210 (see step 4). The result was an additional 14 articles, enough to show the background and directions each of these authors had taken on efficiency wage theory. Note that by combining all of the authors cited by Schultze and the additional authors found in our search for articles with *efficiency* and *wage* in the title with the descriptor code 8210, we were able to narrow down a potential 192 citations (see the number of articles by each author in steps 1 and 4) to 46 citations. Note again that if we had relied on a title word search, we would have found only 6 citations of articles containing the term *efficiency wage* in the title or abstract. As researchers, our next step would be to narrow down the articles to those we wished to look at, based on the direction we might be interested in. We would be able to do this not only by using titles but also abstracts (when available) and the subject descriptor codes included in the bibliographic citation.

The auction theory example (Example 5) can also be used to illustrate the usefulness of combining subject descriptor codes with free-text searching terms. In our earlier search for citations of articles on auction theory, we had found that the auction theory category had been added in 1982. We looked back at the bibliographic citations we had already found and saw that the subject descriptor code for imperfect competition, 0226, appeared on an early citation. This seemed to indicate that some pre-1982 articles might have been classified "0226." Since 0226 (imperfect competition) is a broad category, we decided to combine the descriptor code with the word *auction?* (truncated with a "?" to permit the word *auctions*) (see step 2).

In step 1 we had found 16 citations to articles on auction theory, one of which had been cited by authors of ASSA meeting papers from the session on auction theory. The result of our continued search (see Example 5, step 2) was 7 additional citations, 2 more of which were among the 7 citations in the papers from the ASSA meeting session on auction markets. Three out of 7 is not bad considering that of the 4 remaining journal articles cited by these authors, 3 were either too old or too new to be included in the ELI database. (The fourth article was classified 0226, but did not mention *auction* in the title.)

Example 6, the auto safety regulation search, which we had previously tried using subject descriptor codes, was also left unfinished. It had been a particularly unsatisfactory search, since we had not even found the original Peltzman article (1975). We might have proceeded by adding the term *seat belt* to the consumer protection category 9213 (used in our first search), but an examination of the 8 citations we had found in step 1 indicated that *seat belt* was not in any of the titles. Looking

at the citations more closely, we found the words *safety* and *auto* or *automobile* appeared several times. In the eighth article (see step 1), we spotted another relevant subject descriptor code: "6150—Economics of Transportation." Because safety should fall under consumer protection (9213), we combined 9213 with 6150 and *auto?* for the continuation of this search (see step 2). The result was 11 citations, 6 on safety regulation, including Peltzman's 1975 article. In all, 10 of the 19 citations were specifically on automobile safety regulation. Our total cost on the ELI was less than $5.00. Because auto safety regulation is a subject in fields such as law or health, we will also discuss this search in the following section on the SOCIAL SCISEARCH index.

In our first example we showed a straightforward search for information on multinational mining corporations. We will conclude this section on ELI searches with another straightforward illustration. In Example 8, we conducted a search that might be of interest to economists working in econometrics. The search, for recent theoretical articles on the problem of heteroskedasticity[11] in single equation and simultaneous equation models, shows how one may keep abreast of theoretical developments that go beyond textbook econometrics. We began the search by asking for citations with either 2112 (Econometric and Statistical Methods and Models . . . Inferential Problems in Simultaneous Equation Systems) or 2113 (. . . Miscellaneous Single Equation Inferential Problems) (see Appendix 2 for the full titles of the subject descriptor codes) and heteroskedasticity? or heteroscedasticity? We were interested in recent articles, so we limited the search to the years 1982–1984 (see Example 8). The result was 18 citations to articles specifically on the theoretical aspects of the heteroskedasticity problem.

There is one more feature of the ELI we wish to mention because of its usefulness in combined searches. (In the interest of brevity, we are not including a search example.) The numerical classification system (ELI subject descriptor codes) is hierarchical in nature, so the four-digit descriptor codes may be truncated to 3 (or even 2 or 1) digits in order to include a greater set of citations. Suppose in Example 7 we had been interested in recent articles on OECD manufacturing industries. In order not to limit the articles to any particular manufacturing industry, we would use "631?" (the truncation device) to include citations on any or all manufacturing industries in OECD countries. (Note that we would have to use "631?" not "6310," which is a separate category including general articles on manufacturing industries and articles on several manufacturing industries.)

This discussion of combining searching techniques has suggested that combining author, free-text, and descriptor terms makes the search as specific as possible and obtains useful results. We would like to stress the interactive nature of the search process: The searcher is best served by using as many relevant techniques as possible, and sometimes the techniques themselves are suggested by the results of the first try. We illustrated the development of a search strategy using retrieval results in Example 4 where we found a synonym for *comparable worth* in the abstract; we also used previous search results in the efficiency wage, auction theory, and auto safety regulation searches, where we found appropriate subject descriptor codes in the output.

We would like to emphasize that the full bibliographic record in the ELI index includes all the relevant subject descriptor codes (up to seven), geographic descrip-

[11] See J. Huston McCulloch (1985) for why *heteroskedasticity* should be the "proper English spelling."

EXAMPLE 8

HETEROSKEDASTICITY IN SINGLE EQUATION AND SIMULTANEOUS EQUATION MODELS

? **B 139** [ELI, File 139, as of Mar. 1985]

? **SS DC=2112 or DC=2113) and (heteroskedastic? or heteroscedastic?) and PY=1982:PY=1984**

S1	592	DC=2112
S2	1376	DC=2113
S3	19	HETEROSKEDASTIC?
S4	50	HETEROSCEDASTIC?
S5	20660	PY=1982:PY=1984
S6	18	(DC=2112 OR DC=2113) AND (HETEROSKEDASTIC? OR HETEROSCEDASTIC?) AND PY=1982:PY=1984

? **T 6/2/1**

152618

A NOTE ON COMPUTING THE HETEROSKEDASTICITY CONSISTENT COVARIANCE MATRIX USING INSTRUMENTAL VARIABLE TECHNIQUES
MESSER, KAREN; WHITE, HALBERT
OXFORD BULLETIN OF ECONOMICS AND STATISTICS, MAY 1984, 46 2, 181–84
DESCRIPTORS: ECONOMETRIC AND STATISTICAL METHODS AND MODELS—DISTRIBUTED LAGS AND SERIALLY CORRELATED DISTURBANCE TERMS, MISCELLANEOUS SINGLE EQUATION INFERENTIAL PROBLEMS (2113)

tors, and "named persons" (for the history of thought category). The full title of each subject descriptor is printed along with the subject descriptor number, so it is often unnecessary to refer to a hard-copy list to find related subject descriptor codes. The ELI also includes, for abstracted articles, the same abstract that appears in the quarterly JEL issue. We have not given an example of a search for articles in a particular journal, but that option is also available on the ELI.

These online features mean that the ELI is a more complete index than either the JEL or the annual *Index* volumes. In JEL one may look for citations in the journal contents listing (see the Contents of Current Periodicals department in this issue); under three-digit subject headings (see the Subject Index of Articles department); in the abstracts of Articles in Current Periodicals department under a subject heading, or in the Index of Authors of Articles in Current Periodicals under the author's name (if known). In the annual *Index* volumes, one may look for articles under the expanded four-digit subject headings; the researcher may also look up articles by an author's name in the *Index*. Therefore, because the ELI has all of these possibilities as well as the advantage of combining all of these search techniques, it is potentially a more complete information source than either of its hard-copy antecedents.

In the discussion above we have also tried to suggest that there is a point at which the retrieved references should be consulted. Often, if one can locate a survey article, such as an article in JEL, the bibliography may be used to find a preselected set of further source materials. So by looking at the Yellen article (1984), we would have found, for example, a reference to an unpublished paper by Samuel Bowles that has since been published in the *American Economic Review* (1985). In addition, it is often productive to use more than one database to obtain references. The next two sections will discuss the particular usefulness of two alternative databases covering economics literature.

SOCIAL SCISEARCH

A major alternative source for online bibliographic research for economists is the SOCIAL SCISEARCH™ index, which corresponds to the printed *Social Sciences Citation Index*® and contains references to materials from the social, behavioral, and related sciences. We have not had a great deal of experience in using this index, and so our discussion will be largely based on the December 1984 *User's Guide to Online Searching of SCISEARCH and SOCIAL SCISEARCH* as well as some discussion with members of the staff of the Institute for Scientific Information (ISI), the producers of the index. In addition to having the usual bibliographic search modes of authors and key title words, this database has the distinctive feature of allowing a scholar to develop a bibliography by finding all the articles that cite a given article. In this section we will not repeat the discussion of the search capabilities also available on the ELI, nor will we analyze the use of SOCIAL SCISEARCH in work in the "sociology of knowledge," nor its relation to the developing field of information sciences (see Eugene Garfield 1979); rather, we will emphasize the special search opportunities available using this database.

We will focus here on three of the many interesting search opportunities that are available using this index: citation searching, multidisciplinary journal coverage, and the indexing of the articles by document type. Though the staff at ISI was very cooperative, we did not have the same online resources available to devote to this section as we had for the ELI, so while we report some actual searches, others are hypothetical and illustrative of the searches that can be run. For more information on searching techniques, the reader should consult the *User's Guide* (1984).

Both the printed *Social Sciences Citation Index* and the online SOCIAL SCISEARCH were developed by the ISI. The basic structure of modern citation indexing was developed by one of the most creative workers in the information sciences field, Eugene Garfield, the founder and current president of ISI. He was able to formulate the idea of citation indexing as a bibliographic tool for the sciences after discovering *Shepards Citations,* which had been listing the citations of leading legal decisions for more than a century. Initially Garfield's indexes were produced only as hardbound volumes, in the social sciences as the *Social Sciences Citation Index*, and it was only later that he turned to online computer methods. (See William J. Broad, 1978, for a more detailed history.)

We have found that a key to understanding the structure and use of the citation index comes from a knowledge of how the index is compiled. The basic idea is to define a set of key journals, index all of the articles in them, and then list all of the articles cited in these indexed articles. So, for example, the March 1985 *American Economic Review* would be a key or source journal; Charles Schultze's Presidential Address would be an indexed article; and all of the articles he cites (including the five articles mentioned in the above discussion of Example 2) are also listed. This allows the searcher to find all of the articles cited in an article or to find all of the indexed articles that cite a given article. (So either we could have found all of the articles that Schultze cites, or we could have located the Schultze article by finding the articles that cite, for example, Yellen 1984.)

The cited articles also greatly expand the intellectual and temporal scope of the index, since they also include references to books and articles not included in the source journals published before the start of the index. For example, we were able to do a citation search of a paper published

by Gary S. Becker in 1962 ("Irrational Behavior and Economic Theory") even though the database only indexes journals published since 1972.

The great simplicity and economy of this method of indexing is that, unlike the ELI, no one needs to make any decisions about the appropriate descriptive category for an article. A compensating difficulty is that citations are entered as they appear in the indexed journals and so repeat any errors made in the citation. This may hinder their retrieval.

Citation indexing allows the searcher to pursue two new search options not available on the ELI (always keeping in mind that combinations of commands and integration of databases can yield more complex and useful search options). First, the searcher can follow online the research strategy that most of us typically followed in the era before bibliographic aids or computers became widely available; that is, finding a recent article on the subject and then using its bibliography to extend the search. Secondly, and this is the SOCIAL SCISEARCH index' unique contribution to bibliographic research, it also allows for the strategy of starting with a classic article in the field and then finding all of the citations to it in the indexed journal articles.

We made use of the first method (finding a useful bibliography on the subject and then expanding the search) using some of the illustrative search examples described in the earlier section. After finding the citation to a relevant article on the ELI, we were able to expand the search using the SOCIAL SCISEARCH online index. To develop a bibliography on Gossen, we first found the reference to the Jaffé paper on the ELI and then used the citation index to find the bibliography for Jaffé's paper (1977). Similarly in the discussion of efficiency wage theory, after finding the reference to the 1984 Yellen paper on the ELI, or in footnote 4 of Schultze's Presidential Address in the March 1985 *American Economic Review*, we could have used the SOCIAL SCISEARCH index to retrieve the citations in its bibliography and perhaps find additional references. A full record on this index includes the bibliographic citation of the article and all of its references, though the user has various format possibilities.

We turn next to searches that use the second option, that is, finding all of the indexed articles that cite an article. For an efficient search, the researcher needs to know the first author and initial, year of publication, volume number, and beginning page number of the cited article. (So if we wished to develop a bibliography on efficiency wage theory using Stiglitz' article, we could use: CR = Stiglitz ?, 1976, V28, P185.) This process also implicitly defines a given journal article. (We used the "?" instead of initials because Stiglitz is sometimes cited as "Stiglitz J" and sometimes as "Stiglitz JE." There are other truncation procedures as well that allow the searcher to omit page numbers, etc.) We conducted a search for the literature on efficiency wage theory by looking for articles that cited the Stiglitz article, and the citations we recovered were quite similar to those we found by using the ELI. The citation search, however, was more straightforward, although it assumed that the researcher was familiar with the earlier Stiglitz paper.

We expected this index to be especially good for finding current papers on Peltzman's 1975 article on auto safety regulation. Using the Peltzman article, we were able to locate 53 articles that cited it, including many in noneconomics journals. Really seminal or controversial articles have so many citations to them that it is often necessary to limit the search by using keywords. When we asked for articles citing the Peltzman article and combined it with some form of "safe" (SAFE?) in the title, we found a manageable set of

18 useful references. For many citation searches a seminal paper is suitable, but without appropriate limitations, it may lead to too many citations. This means that for some purposes a less widely known but a more narrowly focused paper would be better.

We cannot emphasize too strongly the importance of being prepared with as much information as possible before undertaking a search on the index. During one search, we did not have the volume number for Becker's 1962 article ("Irrational Behavior and Economic Theory"), and this led to a number of false leads. Similarly, we initiated the search for articles on Gossen or Gossens, and even after using the truncation option, we did a lot of extra searching until it became clear that the problem was not our search procedures: there was not much available. Using the Jaffé citation (1977) found on the ELI proved to be a more efficient strategy in this case.

The capability of retrieving articles citing a seminal article is a self-propelling force that over time will make this index even more useful. In other words, because the literature arising from one article will become the result of future searches, authors who want their articles retrieved will cite a seminal paper in their bibliographies, and the whole process will become self-generating.

The procedure we have described is meant to locate articles citing a particular article. A totally different procedure is involved if one is looking for articles citing works by a particular author. Because the search command for the cited reference index identifies the article by the first author, a searcher must first use the SOCIAL SCISEARCH source (author) index (or the ELI) to find all of the articles written by the author, either as author or coauthor. For instance, if one wanted to find articles citing work of the coauthor of this article, a search using CR = Saffran B? would not find any citations of this article, "Online Information Retrieval for Economists." The proper procedure would be to search the SOCIAL SCISEARCH source (author) index (or the ELI) using the search statement AU = Saffran B. Then one would find that Saffran is the second listed author of this article, and so to find citations to this article, the proper search statement would be CR = Ekwurzel D, 1985, V23, P1728.

Using either the cited reference index or the source index, one can take advantage of another feature of SOCIAL SCISEARCH, its multidisciplinary nature. Unlike the ELI, which indexes only economics and directly related journals, SOCIAL SCISEARCH, as its name indicates, covers a much wider set of fields, ranging from anthropology to urban planning and development. It contains the citations from social science journals (currently 1,430 journals) starting from 1 July 1972 and now also has relevant items from about 3,300 biomedical and natural and physical science journals.

This multidisciplinary element makes it especially useful when searching for topics that have a literature in related fields. So in our search for a bibliography on comparable worth on SOCIAL SCISEARCH we found that using the term *comparable worth* in this multidisciplinary index allowed us to locate the literature on the ongoing debate in the personnel and law journals as well as in the economics journals. On the other hand, the interdisciplinary nature of the index can raise search costs; unless we are careful in limiting the search when the primary interest is in the economics literature then, as we found in the case of the Peltzman example, this index may give economists more interdisciplinary material than they want.

The SOCIAL SCISEARCH index also allows the searcher to select an indexed article by document type (such as review or survey articles or book reviews). This feature permits one of the most efficient research strategies, and the one that we urge

our readers initially to pursue. After finding the survey article, the researcher can then retrieve the complete bibliography of the article online or look the article up in the journal. So, for the automobile safety regulation search, we might combine title words or terms such as *auto?* and *safe?* with a document type ("rev or bib") descriptor to limit the output to review or survey articles. (The ELI does not have this direct capability, though you could come pretty close by using keywords that include *survey* or limiting the search to articles published in the JEL.) This technique is very cost-effective and is especially useful when beginning a search.

Abstracts of Working Papers in Economics (AWPE)

Recently a new database has come online for economists, which consists of working papers with abstracts from more than 50 research centers. It is available on BRS, another large, public online data system. (SOCIAL SCISEARCH is also available on this service as well as on DIALOG.) The search procedures are very similar to those on the ELI (in fact, it even uses the three-digit ELI descriptor codes), and the presence of abstracts allows for free-text searching for words in the abstract. In addition, the AWPE is searchable using keywords and working paper series. Another feature of the AWPE (and also of SOCIAL SCISEARCH) is its availability on BRS's "SDI service." Using this service, one can store a specific search profile, which is automatically executed each time the databases are updated. The user is then sent hard copy of the search results at regular intervals and is therefore able to keep abreast of new articles automatically. For more detailed instructions, the reader should contact BRS (see Appendix 4).

A library staff member ran two searches for us on 16 April 1985 using the AWPE, which at this time covered working papers primarily from 1984. The two topics we pursued were efficiency wage theory and comparable worth. The result of a free-text search using the term *efficiency wage* was two NBER working papers, dated March 1984 and September 1984, and one Stanford Graduate School of Business Research Paper dated June 1984. Using the term *comparable worth*, the result was two September 1984 NBER working papers. Thus, as expected, on the AWPE we were able to retrieve abstracts of papers in progress within the past year.

Summary and Evaluation

Search Techniques

In the examples above we have explained how to use six searching techniques to retrieve bibliographic references in three databases: the ELI, the SOCIAL SCISEARCH index, and the AWPE index. We will now summarize points to remember about the different searching techniques:

- Author searches are useful if one wants to find an article or a bibliography of a particular author.
- Free-text searching is used to find articles with specific words in titles and abstracts (ELI and AWPE have abstracts).
- Subject descriptors on the ELI make use of prescreening by the JEL staff for subject content, geographic areas, and named people (history of economic thought category). On the AWPE, JEL three-digit subject descriptors are added by authors of each working paper; the AWPE also includes keywords. Since many of the subject descriptors cover broad areas, using subject descriptors (ELI and AWPE) works best if two or more descriptors can be combined.
- Combining author and free-text terms with subject descriptors is often the best strategy on the ELI and AWPE. On SOCIAL SCISEARCH, title words may

also be combined with other search commands. The SOCIAL SCISEARCH index includes a "document type descriptor," which may be used to limit the search to articles, book reviews, survey articles, etc. In all the databases, searches may be confined to a single or range of publication years.

• Citation searching is a useful strategy available only on SOCIAL SCISEARCH. In this index one may find all the articles that have cited a particular article. One may also obtain the bibliography of a particular article (such as the Jaffé bibliography on Gossen described above).

Which Database?

We will not compare databases except to point out the differences in materials covered and to review individual features of the ELI, SOCIAL SCISEARCH, and the AWPE. We also omit cost comparisons because costs not only depend on the equipment and the skill of the user but also vary among vendors and are dependent on discounts given to different categories of users.

The ELI covers more than 280 economics journals, including journals produced outside the United States. Although not all of the journals are available in every library, there are a large number of document delivery services, which provide photocopies of articles on request. The ELI is also beginning to include articles in collected papers volumes, proceedings, etc., which are identified by a document type descriptor—"Collective Volume."

The ELI makes use of the four-digit subject descriptors, which are the same as the subject headings used in the *Index of Economic Articles*. All of the subject descriptors appear on the citation of each article, a useful feature because they may provide leads for continuing the search strategy.

SOCIAL SCISEARCH includes in its source index about 1,430 social science journals, about 130 of which are also covered by the ELI. It may also be searched for references to books, book reviews, and any article cited by articles in the source journals, including articles in nonsource journals.

SOCIAL SCISEARCH is the only database to offer the capability of finding articles that cite a particular article. This feature permits one to build up a bibliography using a citation to a seminal article.

The AWPE is a source of up-to-date online information on current, unpublished research in economics. Abstracts of working papers may be searched for using the JEL three-digit subject descriptors as well as authors, free-text terms, and keywords.

Combining Databases

A searcher need not be limited to one of the three databases. As we have pointed out above, one may find a reference to a survey article on the ELI and then look at its bibliography on SOCIAL SCISEARCH or, and we have stressed this strategy, one may find a seminal article on the ELI and then search for articles citing that article on SOCIAL SCISEARCH. As a final step, one may want to search the AWPE for abstracts of work in progress.

Why Search Online?

The most obvious reason for using an online bibliographic index is its cumulative nature: a researcher can retrieve citations for a number of years using one search statement. There are three other important benefits to online seaching: to get a start on research by finding the articles one should read; to make sure one has not missed important articles when one is fairly familiar with the literature on a particular subject; and to look up recent developments on particular topics.

When starting a research project, online bibliographies can provide leads, which one usually should follow up by the traditional hard-copy search, where one reads

articles and looks up other articles cited in reference lists. We have stressed that interaction between the searcher and the search results is necessary to develop an efficient search strategy. The optimal search strategy may often be retrieval of a reference to a survey article (such as the Yellen article on efficiency wage theory) on either ELI or the SOCIAL SCISEARCH. (This capability may be especially useful in getting students started on their term papers.) When one wishes to see studies in a particular area (such as recent productivity studies), the online search may produce a fairly complete bibliography. For more general questions, it may provide only the start of a bibliography.

Checking online indexes to make sure one has not missed important articles or working papers is another important benefit of online services. This type of search is perhaps easier than searches when one is just beginning a research project because one has already narrowed down the concepts (subject descriptors) and the most probable free-text searching terms. A little time spent in developing a searching strategy may especially pay off in this instance (see Appendix 3 for a "Sample Search Request Form").

For economists who wish to keep up with the literature on a particular topic, online searching is a fast, efficient method of identifying articles one wishes to read. As many of the examples above show, online retrieval is a good method for finding information on a current topic.

How to Begin Searching Online

The ELI is available only through DIALOG Information Retrieval Services, which will provide access information on request (addresses and telephone numbers may be found in Appendix 4). The SOCIAL SCISEARCH index is available on DIALOG and also on BRS Information Technologies. The AWPE is only available on BRS. On DIALOG, it is possible to search online on a per use basis, with no subscription fee. Both vendors offer quantity discounts, so working through a librarian is often the least expensive way to retrieve information online.

Large institutional libraries usually have staff members experienced in online searching, most of whom are more familiar with searching techniques than either of the authors. However, only the researcher knows the bibliography he or she is hoping to find. Therefore, the key to an efficient search is proper communication. If the researcher can suggest an appropriate database or search strategy, the librarian will be better able to conduct an efficient and successful search. Appendix 3 includes sample search strategy questions for use when searching the ELI; an analogous question form may be found in the SOCIAL SCISEARCH *User's Guide to Online Searching* (1984). As we have suggested above, a successful search often progresses from the results of an initial search. Conferring with the online searcher about free-text terms and subject descriptors found in an initial search is part of a productive searching strategy.

* * *

By now the reader has probably made some mental notes, such as not to change his or her name if he or she has already published. Familiarity with online information retrieval may cause authors to load titles and abstracts with descriptive words. Also, many authors will realize that to have their articles found on the SOCIAL SCISEARCH index, they should cite a seminal article. Such changes in writing will probably lead to increased efficiency in online searches, although they may also lead to "information overload," and it is in this context that the subject code classifications on the ELI represent an important screening device.

Scholarly economics literature has been

growing rapidly in recent years—one need only compare the number of pages of author citations in the *Index of Economic Articles* in 1969 and 1979 (they have nearly doubled). If this scholarship is to be useful and the research cumulative, then the researcher needs some systematic and efficient way to retrieve economics information. We believe that the online search techniques we have discussed provide such a systematic and efficient method.

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APPENDIX 1
ECONOMIC LITERATURE INDEX FILE DESCRIPTION
(DIALOG FILE 139)

Sample Record

DIALOG Accession Number

100496
The Normative Bias of the Walrasian Model: Walras versus Gossen ← /TI
AU= Jaffé, William
JN= Quarterly Journal of Economics, August 1977, ← PY= or /PY
91 3, 371-87
DC= History of Economic Thought continued—individuals (0322)
Named People: Gossen, Herman Heinrich; Walras, Leon } /DE
abstract in JEL

[Note: 100-word abstracts for selected articles began appearing online in 1984.]

Search Options (for fields using prefixes and suffixes)

Prefix	Field Name	Examples
AU=	Author	AU=Jaffé, William
DC=	Subject Descriptor	DC=History of Economic Thought continued—individuals
JN=	Journal	JN=*Quarterly Journal of Economics*
NA=	Named Person	NA=Gossen, Herman Heinrich
PY=	Publication Year	PY=1977

Suffix	Field Name	Examples
/TI	Title	Gossen/TI
/NA	Named People	Gossen?/NA
/DE	Descriptor	0322/DE (or word such as *history*/DE)
	(Geographic)	U.K./DE
/PY	Publication Year	1977-1984/DE

Sorting

Sortable Fields	Examples	Explanation
Online (SORT) AU, JN, TI	SORT 4/1-10/JN,AU—*fields to sort by* (*set no.*, *no. of records*)	Allows arrangement of citations by journal, author, etc.

Format Options

Number	Record Content
Format 1	DIALOG Accession Number
Format 2	Full Record without Abstract
Format 3	Bibliographic Citation
Format 4	Full Record with Field Prefixes and Suffixes
Format 5	Full Record with Abstract
Format 6	Title and DIALOG Accession Number
Format 7	Bibliographic Citation and Geographic Descriptors
Format 8	Title and Indexing (Descriptors)

APPENDIX 2

ECONOMIC LITERATURE INDEX
CLASSIFICATION SYSTEM
DESCRIPTORS AND DESCRIPTOR CODES

(DC=) (/DE)

0110 GENERAL ECONOMICS
0112 Role of Economics; Role of Economists
0113 Relation of Economics to Other Disciplines
0114 Relation of Economics to Social Values
0115 Methods Used by Economists
0120 TEACHING OF ECONOMICS

0200 GENERAL ECONOMIC THEORY
0210 GENERAL EQUILIBRIUM THEORY
0220 MICROECONOMIC THEORY
0222 Theory of the Household (consumer demand)
0223 Theory of Production
0224 Theory of Distribution (Factor) and Distributive Shares
0225 Theory of Firm and Industry under Competitive Market Structure
0226 Theory of Firm and Industry under Imperfectly Competitive Market Structure
0227 Theory of Auction Markets (1982)
0228 Agent Theory (1982)
0230 MACROECONOMIC THEORY
0231 Developments in General Macroeconomic Theory 1930–45
0232 Theory of Aggregate Demand; Consumption
0233 Theory of Aggregate Demand; Investment
0234 Theory of Aggregate Supply
0235 Theory of Aggregate Distribution
0240 WELFARE THEORY
0242 Allocative Efficiency Including Theory of Cost/Benefit
0243 Redistributive Aspects
0244 Externalities
0250 SOCIAL CHOICE
0260 ECONOMICS OF UNCERTAINTY AND INFORMATION; GAME THEORY AND BARGAINING THEORY (1975)
0261 Theory of Uncertainty and Information (1982)
0262 Game Theory and Bargaining Theory (1982)
0270 ECONOMICS OF CENTRALLY PLANNED ECONOMIES (1978)
0271 Microeconomic Theory (1978)
0272 Macroeconomic Theory (1978)

0310 HISTORY OF ECONOMIC THOUGHT
0311 Ancient, Medieval
0312 Preclassical except Mercantilist
0313 Mercantilist
0314 Classical
0315 Austrian, Marshallian, Neoclassical
0316 General Equilibrium until 1945
0317 Socialist until 1945
0318 Historical and Institutional
0321 Other Schools since 1800
0322 Individuals
0329 Other Special Topics
0360 ECONOMIC METHODOLOGY

0410 ECONOMIC HISTORY, GENERAL
0411 Development of the Discipline
0412 Comparative Intercountry or Intertemporal Economic History
0420 ECONOMIC HISTORY, NORTH AMERICA EXCLUDING MEXICO
0421 History of Product Prices and Markets
0422 History of Factor Prices and Markets
0423 History of Public Economic Policy, all levels
0430 ECONOMIC HISTORY, ANCIENT AND MEDIEVAL UNTIL 1453
0431 History of Product Prices and Markets
0432 History of Factor Prices and Markets
0433 History of Public Economic Policy, all levels
0440 ECONOMIC HISTORY, EUROPE
0441 History of Product Prices and Markets
0442 History of Factor Prices and Markets
0443 History of Public Economic Policy, all levels
0450 ECONOMIC HISTORY, ASIA
0451 History of Product Prices and Markets
0452 History of Factor Prices and Markets
0453 History of Public Economic Policy, all levels
0460 ECONOMIC HISTORY, AFRICA
0461 History of Product Prices and Markets
0462 History of Factor Prices and Markets
0463 History of Public Economic Policy, all levels
0470 ECONOMIC HISTORY, LATIN AMERICA AND CARIBBEAN
0471 History of Product Prices and Markets
0472 History of Factor Prices and Markets
0473 History of Public Economic Policy, all levels
0480 ECONOMIC HISTORY, OCEANIA
0481 History of Product Prices and Markets
0482 History of Factor Prices and Markets
0483 History of Public Economic Policy, all levels

0500 ECONOMIC SYSTEMS
0510 CAPITALIST ECONOMIC SYSTEMS
0520 SOCIALIST AND COMMUNIST ECONOMIC SYSTEMS
0530 COMPARATIVE ECONOMIC SYSTEMS

1110 ECONOMIC GROWTH THEORY AND MODELS
1112 One and Two Sector Growth Models and Related Topics
1113 Multisector Growth Models and Related Topics
1114 Monetary Growth Models
1120 ECONOMIC DEVELOPMENT MODELS AND THEORIES
1130 ECONOMIC PLANNING THEORY AND POLICY
1132 Economic Planning Theory

1136 Economic Planning Policy
1140 ECONOMICS OF WAR, DEFENSE, AND DISARMAMENT

1210 ECONOMIC STUDIES OF DEVELOPING COUNTRIES
1211 Comparative Country Studies
1213 European Countries
1214 Asian Countries
1215 African Countries
1216 Latin American and Caribbean Countries
1217 Oceanic Countries
1220 ECONOMIC STUDIES OF DEVELOPED COUNTRIES
1221 Comparative Country Studies
1223 European Countries
1224 Asian Countries
1225 African Countries
1226 Latin American and Caribbean Countries
1227 Oceanic Countries
1228 North American Countries
1230 COMPARATIVE ECONOMIC STUDIES INVOLVING BOTH MORE AND LESS INDUSTRIALIZED COUNTRIES, INTERNATIONAL STATISTICAL COMPARISONS INVOLVING WHOLE COUNTRIES
1240 ECONOMIC STUDIES OF CENTRALLY PLANNED ECONOMIES (1978)
1241 Comparative Country Studies (1978)
1243 European Countries (1978)
1244 Asian Countries (1978)
1245 African Countries (1978)
1246 Latin American and Caribbean Countries (1978)

1310 ECONOMIC FLUCTUATIONS
1313 Fluctuation; Studies
1320 ECONOMIC FORECASTING AND ECONOMETRIC MODELS
1322 General Forecasts and Models
1323 Specific Forecasts and Models
1324 Forecasting and Econometric Models, Theory and Methodology
1330 GENERAL OUTLOOK
1331 Stabilization Theories and Policies
1332 Wage and Price Controls
1340 INFLATION AND DEFLATION
1342 Inflation Theories, Studies Illustrating Inflation Theories

2110 ECONOMETRIC AND STATISTICAL METHODS AND MODELS
2112 Inferential Problems in Simultaneous Equation Systems
2113 Distributed Lags and Serially Correlated Disturbance Terms, Miscellaneous Single Equation Inferential Problems
2114 Multivariate Analysis, Information Theory, and Other Special Inferential Problems; Queuing Theory; Markov Chains
2115 Bayesian Statistics and Statistical Decision Theory
2116 Time Series and Spectral Analysis
2117 Survey Methods; Sampling Methods
2118 Theory of Index Numbers and Aggregation
2119 Experimental Design; Social Experiments (1977)
2120 CONSTRUCTION, ANALYSIS, AND USE OF ECONOMETRIC MODELS
2130 MATHEMATICAL METHODS AND MODELS
2132 Optimization Techniques
2133 Existence and Stability Conditions of Equilibrium
2134 Computational Techniques
2135 Construction, Analysis, and Use of Mathematical Programming Models
2140 COMPUTER PROGRAMS
2150 EXPERIMENTAL ECONOMIC METHODS (1985)

2200 ECONOMIC AND SOCIAL STATISTICAL DATA AND ANALYSIS
2210 NATIONAL INCOME ACCOUNTING THEORY AND PROCEDURES
2212 National Income Accounts
2213 Income Distribution
2220 INPUT-OUTPUT
2230 FINANCIAL ACCOUNTS; FINANCIAL STATISTICS, EMPIRICAL ANALYSIS OF CAPITAL ADEQUACY
2240 NATIONAL WEALTH AND BALANCE SHEETS
2250 SOCIAL INDICATORS AND SOCIAL ACCOUNTS
2260 PRODUCTIVITY AND GROWTH; THEORY AND DATA
2270 PRICES
2280 REGIONAL STATISTICS
2290 MICRODATA

3100 DOMESTIC MONETARY AND FISCAL THEORY AND INSTITUTIONS
3110 DOMESTIC MONETARY AND FINANCIAL THEORY AND POLICY
3112 Monetary Theory, Empirical Studies
3116 Monetary Policy (Including All Central Banking Topics)
3120 COMMERCIAL BANKING
3130 CAPITAL MARKETS
3131 Capital Markets, Theory (Including Portfolio Selection) (1977)
3132 Capital Markets, Empirical Studies (Including Regulation)
3135 Portfolio Selection, Theory and Studies (discontinued 1977)
3140 FINANCIAL INTERMEDIARIES
3150 CREDIT TO BUSINESS, CONSUMER, ETC. (INCLUDING MORTGAGES)
3151 Consumer Finance
3152 Mortgage Market
3153 Business Credit

3200 FISCAL THEORY AND POLICY; PUBLIC FINANCE
3210 FISCAL THEORY AND POLICY
3212 Fiscal Theory; Empirical Studies Illustrating Fiscal Theory
3216 Fiscal Policy, Studies
3220 NATIONAL GOVERNMENT EXPENDITURES AND BUDGETING

3221 National Government Expenditures
3226 National Government Budgeting
3228 National Government Debt Management
3230 NATIONAL TAXATION AND SUBSIDIES
3240 STATE AND LOCAL GOVERNMENT FINANCE
3241 State and Local Government Expenditures and Budgeting
3242 State and Local Government Taxation, Subsidies, and Revenue
3243 State and Local Government Borrowing
3250 INTERGOVERNMENTAL FINANCIAL RELATIONSHIPS

4000 INTERNATIONAL ECONOMICS

4110 INTERNATIONAL TRADE THEORY
4112 Theory of International Trade: Prices, Comparative Advantage, etc.
4113 Theory of Protection
4114 Theory of International Trade and Economic Development

4200 TRADE RELATIONS; COMMERCIAL POLICY; INTERNATIONAL ECONOMIC INTEGRATION
4210 TRADE RELATIONS
4220 COMMERCIAL POLICY AND TRADE REGULATIONS; EMPIRICAL STUDIES
4230 ECONOMIC INTEGRATION
4232 Theory of Economic Integration
4233 Economic Integration, Policy and Empirical Studies

4300 BALANCE OF PAYMENTS, INTERNATIONAL FINANCE
4310 BALANCE OF PAYMENTS; MECHANISMS OF ADJUSTMENT; EXCHANGE RATES
4312 Balance of Payments and Adjustment Mechanisms and Impacts, Theory
4313 Balance of Payments and Adjustment Mechanisms, Studies
4314 Exchange Rates and Markets
4320 INTERNATIONAL MONETARY ARRANGEMENTS
4330 PRIVATE INTERNATIONAL LENDING (1984)

4410 THEORY OF INTERNATIONAL INVESTMENT AND LONG-TERM CAPITAL MOVEMENTS
4412 International Investment and Capital Markets—International Investment and Long-Term Capital Movements, Studies
4420 INTERNATIONAL BUSINESS; MANAGEMENT AND POLICIES; ECONOMIC IMPERIALISM AND HOST COUNTRY POLICIES
4430 INTERNATIONAL LENDING AND AID (PUBLIC) (see 4330 after 1984 for private lending)

5000 ADMINISTRATION; BUSINESS FINANCE; MARKETING; ACCOUNTING

5110 ORGANIZATION AND DECISION THEORY
5120 MANAGERIAL ECONOMICS
5130 BUSINESS AND PUBLIC ADMINISTRATION
5131 Business Administration (1975)
5132 Public Administration (1975)
5140 GOALS AND OBJECTIVES OF FIRMS
5200 BUSINESS FINANCE AND INVESTMENT
5210 BUSINESS FINANCE
5220 BUSINESS INVESTMENT

5310 MARKETING AND ADVERTISING

5410 ACCOUNTING

6000 INDUSTRIAL ORGANIZATION; TECHNOLOGICAL CHANGE; INDUSTRY STUDIES

6100 INDUSTRIAL ORGANIZATION AND PUBLIC POLICY
6110 MARKET STRUCTURE, INDUSTRIAL ORGANIZATION, AND CORPORATE STRATEGY
6120 PUBLIC POLICY TOWARDS MONOPOLY AND COMPETITION
6130 PUBLIC UTILITIES AND COSTS OF GOVERNMENT REGULATION OF OTHER INDUSTRIES IN THE PRIVATE SECTOR
6131 Regulation of Public Utilities (1977)
6132 Effects of Intervention on Market Structure, Costs, and Efficiency (1977)
6140 PUBLIC ENTERPRISES
6150 ECONOMICS OF TRANSPORTATION
6160 INDUSTRIAL POLICY (1978)

6210 TECHNOLOGICAL CHANGE; INNOVATION; RESEARCH AND DEVELOPMENT
6211 Technological Change and Innovation
6212 Research and Development

6300 INDUSTRY STUDIES
6310 INDUSTRY STUDIES, MANUFACTURING
6312 Metals (iron, steel, and other)
6313 Machinery (tools, electrical equipment, computers, and appliances)
6314 Transportation and Communication Equipment
6315 Chemicals, Drugs, Plastics, Ceramics, Glass, Cement, and Rubber
6316 Textiles, Leather, and Clothing
6317 Forest Products, Lumber, and Paper
6318 Food Processing (excluding agribusiness), Tobacco, and Beverages
6319 Other Industries
6320 INDUSTRY STUDIES, EXTRACTIVE INDUSTRIES
6322 Mining (metal, coal, and other nonmetallic minerals)
6323 Oil, Gas, and Other Fuels
6330 INDUSTRY STUDIES, DISTRIBUTIVE TRADES
6332 Wholesale Trade
6333 Retail Trade
6340 INDUSTRY STUDIES, CONSTRUCTION
6350 INDUSTRY STUDIES, SERVICES AND RELATED INDUSTRIES
6352 Electrical, Gas, Communication, and Information Services
6353 Personal Services
6354 Business and Legal Services
6355 Repair Services
6356 Insurance

6357 Real Estate
6358 Entertainment, Recreation, Tourism
6360 NONPROFIT INDUSTRIES: THEORY AND STUDIES (1977)

6400 ECONOMIC CAPACITY

7000 AGRICULTURE; NATURAL RESOURCES

7110 AGRICULTURAL SUPPLY AND DEMAND ANALYSIS
7120 AGRICULTURAL SITUATION AND OUTLOOK
7130 AGRICULTURAL POLICY, DOMESTIC AND INTERNATIONAL
7140 AGRICULTURAL FINANCE
7150 AGRICULTURAL MARKETING AND AGRIBUSINESS
7151 Agribusiness
7160 FARM MANAGEMENT
7170 LAND REFORM AND LAND USE
7171 Land Ownership and Tenure; Land Reform
7172 Land Development; Land Use; Irrigation Policy
7180 RURAL ECONOMICS

7200 NATURAL RESOURCES; CONSERVATION AND POLLUTION; ENERGY
7210 NATURAL RESOURCES
7211 Recreational Aspects of Natural Resources
7220 CONSERVATION AND POLLUTION
7230 ENERGY (1973)

7310 ECONOMIC GEOGRAPHY

8000 MANPOWER, LABOR, POPULATION

8100 MANPOWER TRAINING AND ALLOCATION; LABOR FORCE AND SUPPLY
8110 MANPOWER TRAINING AND DEVELOPMENT
8120 OCCUPATION
8130 LABOR FORCE
8131 Agriculture
8132 Manufacturing
8133 Service
8134 Professional
8135 Government Employees
8136 Construction

8200 LABOR MARKETS; PUBLIC POLICY
8210 THEORY OF LABOR MARKETS AND LEISURE
8220 PUBLIC POLICY; ROLE OF GOVERNMENT
8221 Wages and Hours
8222 Workmen's Compensation and Vocational Rehabilitation
8223 Factory Act and Safety Legislation
8224 Unemployment Insurance
8225 Government Employment Policy (including employment services)
8226 Employment in Public Sector; Statistical Studies

8230 LABOR MOBILITY; NATIONAL AND INTERNATIONAL MIGRATION
8240 LABOR MARKET STUDIES, WAGES, EMPLOYMENT
8241 Geographic Labor Market Studies
8242 Wage, Hours, and Fringe Benefit Studies
8243 Employment Studies; Unemployment and Vacancies; Retirement and Quits
8250 LABOR PRODUCTIVITY
8260 LABOR MARKETS: DEMOGRAPHIC CHARACTERISTICS

8300 TRADE UNIONS; COLLECTIVE BARGAINING; LABOR-MANAGEMENT RELATIONS
8310 TRADE UNIONS
8320 COLLECTIVE BARGAINING
8321 Collective Bargaining in the Private Sector
8322 Collective Bargaining in the Public Sector
8330 LABOR-MANAGEMENT RELATIONS
8331 Labor-Management Relations in the Private Sector
8332 Labor-Management Relations in the Public Sector

8410 DEMOGRAPHIC ECONOMICS

8510 HUMAN CAPITAL

9100 WELFARE, HEALTH, AND EDUCATION
9110 GENERAL WELFARE PROGRAMS
9120 ECONOMICS OF EDUCATION
9130 ECONOMICS OF HEALTH (INCLUDING MEDICAL SUBSIDY PROGRAMS)
9140 ECONOMICS OF POVERTY
9150 SOCIAL SECURITY, PUBLIC SUPERANNUATION AND SURVIVORS BENEFITS
9160 ECONOMICS OF LAW AND CRIME
9170 ECONOMICS OF MINORITIES; ECONOMICS OF DISCRIMINATION
9180 ECONOMICS OF AGING

9210 CONSUMER ECONOMICS; LEVELS AND STANDARDS OF LIVING
9211 Living Standards Studies and Composition of Overall Expenditures
9212 Expenditure Patterns and Consumption of Specific Items
9213 Consumer Protection

9300 URBAN ECONOMICS
9310 URBAN ECONOMICS AND PUBLIC POLICY
9320 HOUSING ECONOMICS, INCLUDING NONURBAN HOUSING
9330 URBAN TRANSPORTATION ECONOMICS

9410 REGIONAL ECONOMICS
9411 Theory of Regional Economics
9412 Regional Economic Studies
9413 Regional Economic Models and Forecasts

Notes to Appendix 2: 1. DIALOG includes the general category title (capital letter descriptors in the list above) as well as the particular category title. For example, in Example 2, the last subject descriptor 6322 is identified by its full title—"Industry Studies, Extractive Industries, Mining." Please take note, however, that the descriptors shown in capital letters (which also end in 0) are general descriptor codes used *only* for articles that either apply to the whole area or that do not fit under specific sublevel descriptors. If one wishes to find articles classified under *all* sublevel descriptors, one should use the truncation feature (e.g., 631? for articles on manufacturing industries).

2. Dates of additions and deletions appear in parentheses. These dates refer to the time the change was incorporated in the JEL and often cover article publication dates in earlier years because of the lag in time between publication and JEL indexing.

3. An annotated version of the subject descriptors and codes appears in the *Index of Economic Articles*. In addition, the *Index* contains a topical guide (thesaurus) to the descriptors.

APPENDIX 3

SAMPLE SEARCH REQUEST FORM

ECONOMIC LITERATURE INDEX

(DIALOG FILE 139)

Name: Date:

Title of project/request:

Description of topic (include concepts, models, applications, alternative spellings, and definitions):

Related topics of interest:

ELI subject descriptors:

ELI geographic descriptors:

ELI named person descriptors (History of Economic Thought):

Key words in titles and/or abstracts:

Years of publication:

Specific authors:

Specific journal titles:

Document type: Journals only Collective volumes only All document types

Nonapplicable related subject descriptors:

Nonapplicable related key words:

How many printed citations? Print abstracts (Format 5)?

Other format:

Search other databases (instructions):

APPENDIX 4
INFORMATION SOURCES

For information on accessing DIALOG,

Write to:	or Telephone:
DIALOG Information Services, Inc. 3460 Hillview Avenue Palo Alto, CA 94304	800/277-1927 (outside California) 800/982-5838 (inside California) 415/858-3785 800/227-8282 (Training)

DIALOG International Representatives:

Insearch Ltd. Haymarket, Australia	Micromedia Toronto, Canada
Learned Information/DIALOG Oxford, England	
Kinokuniya Co., Ltd. Tokyo, Japan	Maruzen Co., Ltd. Tokyo, Japan

Search Aids:

- A documentation chapter on the ELI (File 139) may be ordered from DIALOG for $5.00 ($6.00 overseas).
- The *Index of Economic Articles* (latest volume, 1983) includes an annotated version of the classification system used for the ELI subject descriptors; it also contains a topical guide (thesaurus) to the classification system.

Training:

DIALOG and BRS offer regular training sessions for beginners and advanced users at locations throughout the United States and in other countries.

For information on accessing BRS/Information Technologies,

Write to:	or Telephone:
BRS 1200 Route 7 Latham, NY 12110	800/883-4707 (outside New York State) 800/553-5566 (inside New York State) 518/783-7251 (collect from Canada, Alaska, and Hawaii)